

What is claimed is:

- 1        1. A system usable with a subterranean well having a casing, the system  
2 comprising:
  - 3              an apparatus associated with production of well fluid from the well and being located  
4 downhole in the well in a passageway of the casing; and
  - 5              a non-acoustic sensor located downhole near the apparatus in the passageway and  
6 adapted to measure a characteristic of the well located outside of the casing.
- 1        2. The system of claim 1, wherein the apparatus comprises a packer.
- 1        3. The system of claim 2, wherein the packer is adapted to position the sensor  
2 against an interior wall of the casing in an expanded state of the packer.
- 1        4. The system of claim 1, wherein the apparatus comprises a tubing.
- 1        5. The system of claim 4, wherein the sensor is part of a network of sensors  
2 located inside a passageway of the tubing.
- 1        6. The system of claim 4, wherein the sensor is attached to an exterior wall of the  
2 tubing.
- 1        7. The system of claim 1, wherein the sensor is attached to the apparatus.
- 1        8. The system of claim 1, wherein the sensor comprises a resistivity sensor, a  
2 nuclear sensor, a gravity/force sensor, a pressure sensor or a temperature sensor.
- 1        9. The system of claim 1, wherein the sensor is adapted to measure the  
2 characteristic without requiring puncturing of the well casing.

1           10. The system of claim 1, wherein the sensor is adapted to puncture the casing to  
2 measure the characteristic.

1           11. A method usable with a subterranean well having a casing, the method  
2 comprising:

3           producing fluid from the well;  
4           positioning a non-acoustic sensor downhole inside a passageway of the casing; and  
5           using the sensor during the producing to measure a characteristic of the well located  
6 outside of the casing.

1           12. The method of claim 11, further comprising:  
2           placing the sensor in a packer; and  
3           deploying the packer downhole.

1           13. The method of claim 12, further comprising:  
2           setting the packer; and  
3           positioning the sensor against an interior wall in of the casing in response to the  
4 setting.

1           14. The method of claim 11, further comprising:  
2           deploying a tubing to support the sensor downhole.

1           15. The method of claim 14, further comprising:  
2           deploying the sensor downhole inside a passageway of the tubing.

1           16. The method of claim 14, further comprising:  
2           attaching the sensor to an exterior wall of the tubing.

1           17. The method of claim 14, further comprising:  
2           attaching the sensor to an apparatus associated with the completion of the well.

1        18. The method of claim 11, wherein the sensor comprises a resistivity sensor, a  
2        nuclear sensor, a gravity/force sensor, a pressure sensor or a temperature sensor.

1        19. The method of claim 11, wherein the using comprises:  
2        using the sensor to measure the characteristic without requiring puncturing of the well  
3        casing..

1        20. The method of claim 11, further comprising:  
2        puncturing the casing to measure the characteristic.

1        21. A system usable with a subterranean well having a casing, the system  
2        comprising:

3        a transmitter to contact an interior wall of the casing to transmit a first current;  
4        a receiver to contact an interior wall of the casing to receive a second current  
5        produced in response to the first current; and  
6        a circuit coupled to receiver to use to the second current to indicate a resistivity  
7        measurement.

1        22. The system of claim 21, further comprising:  
2        a packer attached to either the transmitter or receiver.

1        23. The system of claim 22, wherein the packer is adapted to position said either  
2        the transmitter or receiver against the interior wall of the casing in an expanded state of the  
3        packer.

1        24. The system of claim 21, further comprising:  
2        a tubing attached to either the transmitter or receiver.

1        25. The system of claim 21, wherein the transmitter and receiver are part of a  
2        network of sensors located inside a passageway of the tubing.

1           26. The system of claim 21, wherein either the transmitter or receiver is attached  
2 to an exterior wall of the tubing.

1           27. The system of claim 21, wherein the casing comprises:  
2           a first insulative section in contact with the receiver; and  
3           a second insulative section in contact with the transmitter.

1           28. The system of claim 27, wherein the casing further comprises:  
2           an electrically conducting section located between the first and second insulative  
3 sections.

1           29. The system of claim 21, further comprises:  
2           bow springs to establish the contacts for the receiver and transmitter.

1           30. The system of claim 21, wherein the casing comprises an electrically  
2 conductive casing.

1           31. An apparatus usable with a subterranean well having a casing, the apparatus  
2 comprising:

3           a punch to be positioned inside a passageway of the casing and pierce the casing to  
4 establish communication with a region outside of the casing; and

5           a sensor to be positioned inside the passageway of the casing to indicate a  
6 characteristic associated with the region.

1           32. The apparatus of claim 31, wherein the sensor indicates a resistivity associated  
2 with the region.

1           33. The apparatus of claim 31, wherein the sensor indicates a nuclear  
2 measurement associated with the region.

1           34. The apparatus of claim 31, wherein a force/gravity sensor indicates a density  
2           associated with the region.

1           35. The apparatus of claim 31, further comprising:  
2           sealing elements to seal off a portion of the casing pierced by the punch.

1           36. The apparatus of claim 31, further comprising:  
2           at least one slip to secure the apparatus to the well casing.

1           37. The apparatus of claim 31, wherein the punch includes a cavity and the sensor  
2           is located inside the cavity.

1           38. The apparatus of claim 31, wherein the punch moves to pierce the casing in  
2           response to a packer being set.

1           39. The apparatus of claim 31, further comprising:  
2           sleeves to compress the punch to force the punch into the casing.

1           40. The apparatus of claim 31, wherein the punch includes another passageway to  
2           establish communication between the region and the sensor.

1           41. A packer comprising:  
2           a tubular member;  
3           sealing elements to form seals between the tubular member and a well casing and  
4           form a sealed region between the seals;  
5           a puncture device to be positioned inside a passageway of the casing and pierce the  
6           casing to establish communication with a region outside of the casing; and  
7           a sensor to be positioned inside the passageway of the casing to indicate a  
8           characteristic associated with the region outside of the casing.

1           42. The packer of claim 41, wherein the puncture device comprises a punch.

1           43. The packer of claim 41, wherein the puncture device comprises a shaped  
2           charge.

1           44. The packer of claim 41, wherein the sensor is in fluid communication with the  
2           sealed region.

1           45. The packer of claim 41, wherein the sensor indicates one of a resistivity, a  
2           nuclear measurement, a pressure and a gravity/pressure associated with the region.

1           46. The packer of claim 41, further comprising:  
2           sleeves to force the punch into the casing.

1           47. The packer of claim 41, further comprising:  
2           sleeves to concurrently force the punch into the casing and compress the sealing  
3           elements.

1           48. The packer of claim 41, wherein the packer comprises a hydraulically set  
2           packer.

1           49. The apparatus of claim 41, wherein the puncture device includes a passageway  
2           to establish communication between the region and the sensor.

1           50. A method usable with a subterranean well having a casing, the method  
2           comprising:  
3           providing a puncture device inside a packer; and  
4           actuating the puncture device when the packer is set to pierce the casing to establish  
5           communication with a region outside of the casing.

1           51. The method of claim 50, further comprising:  
2           sensing a characteristic of the region outside of the casing via the communication  
3           established by the puncture device.

1           52. The method of claim 50, wherein the sensing comprises sensing one of a  
2 resistivity, a pressure, a nuclear measurement and a gravity.

1           53. The method of claim 50, further comprising sealing off a portion of the casing  
2 pierced by the punch.

1           54. The method of claim 50, wherein the puncture device comprises a shaped  
2 charge.

1           55. The method of claim 50, wherein the puncture device comprises a punch.

1           56. The method of claim 55, further comprising actuating sleeves to force the  
2 punch into the casing when the packer is set.

1           57. A method usable in a subterranean well, comprising:  
2 establishing communication between an exterior of a casing of the well and a sealed  
3 region defined by spaced elements of a packer.

1           58. The method of claim 57, wherein the establishing comprises:  
2 piercing the casing.

1           59. The method of claim 58, wherein the piercing comprises:  
2 piercing the casing with a shaped charge.

1           60. The method of claim 58, wherein the piercing comprises:  
2 piercing the casing with a punch.

61. A method usable with a subterranean well, comprising:  
establishing a sealed region downhole;  
within the sealed region, piecing a casing of the well; and  
without flowing fluids uphole from the sealed region, using the pierced casing to  
measure a characteristic associated with a region outside of the casing.

62. The method of claim 61, wherein the establishing comprises:  
setting at least one packer downhole.

63. The method of claim 61, wherein the piercing comprises:  
using a shaped charge.

64. The method of claim 61, wherein the piercing comprises:  
using a punch.

65. The method of claim 61, wherein the establishing comprises:  
setting multiple spaced packers.

66. The method of claim 61, further comprising:  
selecting the region to measure one of a gravity, pressure, resistivity and nuclear measurement associated with the region.

67. A method usable with a subterranean well, comprising:

- establishing at least one sealed region downhole;
- in said at least one sealed region, piercing a casing of the well; and
- without flowing fluids uphole from the sealed region, using the results of the piercing to establish an array of downhole sensors.

68. The method of claim 67, wherein the establishing comprises:  
setting at least one packer downhole.

1       69. The method of claim 67, wherein the piercing comprises:  
2       using a shaped charge.

1       70. The method of claim 67, wherein the piercing comprises:  
2       using a punch.  
                

1       71. The method of claim 67, wherein the establishing comprises:  
2       setting multiple spaced packers.

1       72. The method of claim 67, further comprising:  
2       selecting the region to measure one of a gravity, pressure, resistivity and nuclear  
3       measurement associated with the region.

1       73. The method of claim 67, further comprising:  
2       measuring a force associated with the piercing; and  
3       using the measured force to derive a strength of a formation.

1       74. The method of claim 67, further comprising:  
2       measuring a rate associated with the piercing; and  
3       using the measured rate to derive a strength of a formation.

1       75. A system usable with a subterranean well having a casing, the system  
2       comprising:  
3       a packer to be lowered downhole inside the casing; and  
4       a sensor attached to the packer to measure a characteristic of the well.

1       76. The system of claim 75, wherein the packer is adapted to position the sensor  
2       against an interior wall of the casing in an expanded state of the packer.

1       77. The system of claim 75, wherein the sensor comprises a resistivity sensor, a  
2       nuclear sensor, a gravity/force sensor, a pressure sensor or a temperature sensor.

1           78. The system of claim 75, wherein the sensor is mounted inside the packer to  
2 measure fluids flowing through the packer.

1           79. A system usable with a subterranean well, comprising:  
2           an apparatus to be located downhole inside a casing of the well; and  
3           a projectile deployment device to produce a projectile to pierce the casing of the well,  
4           wherein the projectile includes a sensor to perform a measurement associated with the well.

1           80. The system of claim 79, further comprising:  
2           a tethered communication connection between the projectile and the packer.

1           81. The system of claim 79, wherein the projectile communicates via a wireless  
2 link with the packer.